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The Central Atlantic Regional Educational Laboratory (CAREL) Center for Educational Diagnosis and Learning is a model based on a cybernetic approach for the development of educational programs designed to personalize the student's instructional experiences and humanize his daily living. The CAREL Project has set three major objectives and 12 component subobjectives, projected over a five-year period, which must be accomplished to achieve the full operation of centers. The major objectives include (1) development of a replicable paradigm of educational experiences which can maximize learning oppoerunities within a child's environment and lead to full realization of the potential of children from age two to nine, (2) development and validation of a method for diagnosing the educational needs of these children, using a computer storage and retrieval system to process salient information on each child, and (3) development of a system which will permit reliable and valid measurement of the results of educative strategies employed to personalize instruction for children as well as validation of CAREL's Project during the research, field testing, demonstration, and diffusion stages. (Author/SG)

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THE CAREL CENTER FOR EDUCATIONAL DIAGNOSIS AND LEARNING: A SELF-CORRECTING INNOVATIVE MODEL

Albert Jenny*

The quality of education at all levels is under fire today. Children and young people go to school in the ghettos, in affluent urban areas, in suburbs, in rural settings, and–everywhere–significant segments of this school population go awry or go nowhere. Whatever the intricate societal causes may be, the schools appear to be missing the opportunity, afforded by large blocks of time with these young people, to have a positive impact. The proposed CAREL Center project represents a new beginning toward breaking the deadlock of ineffective action.

This paper will present the basic rationale of the CAREL Center project–its reason for being–followed by an examination of its methodology and an outline of expected outcomes. The problem of setting up Centers will receive some attention at the outset, since the character of negotiations and arrangements with members of communities in which the experiment may take place, and with local public agencies, may well be as complex, and certainly as important for success, as the program design itself. However, the organizational framework cannot be pinned down completely at this stage of the project. Special adaptations will almost inevitably be required if a Center is to work well with particular educational, economic, and political structures and be responsive to popular aspirations in those communities which ultimately choose to participate in the project.

A NEW APPROACH TO EDUCATION

There is increasing evidence that many students in our schools, at all ages and grade levels, are rather insensitive to (or have never become acquainted with) many of the values associated with the growth of western civilization. It is frequently assumed that such deficits are limited to so-called disadvantaged areas, but there is no monopoly on this problem. Not only are many older values becoming attenuated, but newer concepts and bodies of knowledge necessary for living effectively in the present-day world are not always transmitted or received in a manner likely to generate creative, functioning citizens in our society.

Hardly anyone acquainted with anthropological realities questions the relativity of values in many aspects of life, or the plurality of viable cultural systems, but, if we wish to maintain a society in which the democratic process, concern for other human beings, love of truth, orderly behavior, constitutional government and a number of other concepts are considered basic to the good life, certain values must remain part of the heritage of every member of society. With the disadvantaged, neglect by society and its institutions and lack of clear pathways into the mainstream have frequently blighted the transmission and development of such values.

With the others, preoccupation with making ends meet rather than with the ends of living on the part of elders may have contributed to a not dissimilar attrition of values in recent decades.

Along with this incipient modification of the value-structure of our society has come increasing technological complexity, requiring a variety and depth of education only rarely provided. To develop the full potential of every member of society, this variety and depth must be extended to the entire student community. Ways must be found to amplify and improve our educational resources, while making better use of those we have. Goals and objectives, as well as needed resources, must be specified and the newer techniques of systems analysis, planning and evaluation must be brought to bear on the educational process.

In the suburban and uban schools, many students with high natural endowment, as demonstrated by standard testing devices, do not come up to national norms in performance. Life-patterns develop which are not calculated toward contributing to or benefiting from the vast social machinery underlying our evolving civilization. Nor do traditional curricula and expectations meet the needs of the disadvantaged, among whom early regression is all too frequent, regardless of original endowment. A new approach to

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education is needed–one which, when tried and modified in the light of practical experience, might re-direct the thrust of educational practice. Such an approach would, at one and the same time, need to personalize the instruction in terms of each child's percepts and realities, and bring into use the fruits of modern research on the methodology and technology of education.

STEPS TOWARD EXCELLENCE

It is hoped that the CAREL Centers for Educational Diagnosis and Learning may serve as prototypes for such an educational system by instituting:

- special support teams to provide recurring cycles of personal-diagnostic, strategy-planning, and evaluative data about each child to instructional teams;
- a program and sequence of learning experiences which grow out of children's life-styles, and integrate the child's activities at home, on the street, and in the school;
- a teaching-learning process that is intuitive, sensitive, warm, accepting, flexible, imaginative and responsive to each child in the light of diagnostic results;
- personal and social services to promote maximum physical, social and intellectual development;
- flexible grouping, as well as flexible use of time-blocks, to eliminate lock-step traditional grade patterns, including extension of the school day and year where needed;
- a continuing program of staff development through cooperation with other educational institutions in the area concerned, and staff organizational patterns that can provide for the total needs of the child (e.g., needs for more food or sleep, or for relaxation of home-produced tensions);
- use of technology to create materials of instruction which are relevant to the child's life experiences, when no commercial materials are available, and to provide strategies and techniques which match the child's motivational characteristics and learning styles.

Central to successful implementation of the CAREL model is the creation of an heuristic data-bank, containing information on each child. Students, teachers, aides, administrators and parents would supply information to be used in the initial stages of development. Members of the CAREL staff are currently designing a computer-based retrieval system to store, maintain, update, analyze, and report the decision-making information necessary for implementation of the Center, which will, at the same time, insure the privacy of both students and parents.

While there appears to be need for learning centers having these characteristics and facilities at all levels of education, it is intended that development will proceed in stages, beginning with the establishment of primary units, directed toward children, aged two through nine. Perhaps the most compelling reason for commencing this attempt to improve education at the early childhood end of the scale is that improvements made at this level should have a continuing effect on the educational experience of students. Until positive changes are instituted in the early years of learning, efforts to improve education at later stages will be severely hampered. A quote from Bloom is relevant:

> . . . the longitudinal studies of educational achievement indicate that approximately 50% of general achievement of grade 12 (age 18) has been reached by the end of grade 3 (age 9). This suggests the great importance of the first few years of school as well as the preschool period in the developing of learning patterns and general achievement. These are the years in which general learning patterns develop most rapidly, and failure to develop appropriate achievement and learning in these years is likely to lead to continued failure or near failure throughout the remainder of the individual's school career. The implications for more powerful and effective school environments in the primary school grades are obvious[1].

There has been a steady increase in the amount of research in relation to cognitive, psychomotor and affective development of young children during the last decade. Positive results have been reported from innovative early childhood projects, but these have been isolated, fragmented attempts that have had little impact on the total problem of institutional change. Establishment of one or more of the proposed Centers for a five year initial period may provide enough "critical mass in one place" to change the dream of educational excellence for all children into reality.

PREPARING THE WAY

In order to establish CAREL Centers for Educational Diagnosis and Learning, it will be necessary to enlist the active support of communities in which the Centers will be located. Innovation imposed from without is always suspect, but this is not the only reason members of participating communities should be invited to make recommendations and take part in deliberations from the beginning. Since the proposed project will reach into children's homes and seek the assistance and cooperation of parents, a mechanism must be devised to ensure their full partnership in the venture.

One way to bring this about would involve creation of a Center Assembly consisting of representatives of some such body as a Community Council, and of organized parent groups from both participating and observing schools in the general neighborhood of a Center. Representatives from local community agencies such as the Public Library, Recreation Department, Health Department, and Welfare Department should be included, so that cooperation from these organizations could reasonably be expected. For liaison and resource purposes, inclusion of staff members of the State Education Agency, of a non-public education agency in the area, and of CAREL would be useful. Such members could help keep the program on course, and at the same time be responsive to community feeling.

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[1] Benjamin S. Bloom, *Stability and Change in Human Characteristics*, (New York: John Wiley and Sons, 1964), p. 127.

After satisfactory relationships have been established with the community and the cooperating Board of Education, CAREL staff members will assume temporary responsibility for supervision and administration of participating schools, with the intent of relinquishing this responsibility in the course of time, when the Center has begun to demonstrate its value and local school staffs have become experienced in carrying on the program.

CAREL staff will also work continuously with individuals and groups in the community to bring them into the Center as aides or observers. Teacher organizations in the area would need to be involved, and working agreements developed, so that teachers in the school or schools constituting a Center, who were not interested in the program, could be transferred elsewhere without loss of any kind, and new teachers brought in for training.

A final step in this basic implementation process consists of the development of the necessary fiscal personnel and administrative procedures with cooperating school officials in order to begin the program itself. Once this and all the other organizing tasks touched upon have been accomplished, one or more Centers can come into being. Of course, this is based on the assumption that needed base-line data have been acquired, and that all technical facets, methodology, and research designs relative to actual operation of the Center have been worked out during or prior to the negotiations and activities described. Present plans call for simultaneous action on working toward acceptance of a Center by community and School Board and the technical development of the Centers themselves once one or more sites have been established. Much of the conceptual work has already been done, and these concepts, as well as the nature of steps toward making them operational, will be treated in the following sections.

SELECTION OF THE MODEL

The CAREL model has been selected from alternative models because it is basically a cybernetic approach to the development of educational programs which are designed to personalize the student's instructional experiences and humanize his daily living. It should have more adaptability than other theoretical models. A cybernetic approach assumes, at the outset, that education is the applied science of human development and human learning. It adheres to the concept that learning proceeds in a developmental context wherein its course is defined by both the general features of human design and by the particular developmental progress of the particular individual. Further, so-called normal development is dependent on appropriate sensory experiences. Thus, valid principles of educational design must encompass some understanding of development-learning interactions.[2]

[2] Karl U. Smith and Margaret Foltz Smith, *Cybernetic Principles of Learning and Educational Design,* (New York: Holt, Rinehart and Winston, Inc., 1966), pp. 460-464.

In any innovative attempt, the opportunity to change in mid-stream must be an integral part of the program. As feedback proceeds, changes in operation may be called for, requiring some form of perpetual inventory system to provide data on the status of the operation. Thus, the need for and use of data is not ignored and a legitimate way to conduct research and evaluation of educational innovation is provided.[3]

PROJECT DESIGN AND OBJECTIVES

The project design has been structured to focus on objectives which would provide the greatest return in terms of CAREL's available human and material resources. Three major objectives have been set, each of which has three component sub-objectives, constituting necessary conditions for initiating successful operation of the Centers. These must be accomplished during the first year of the project. There are three other sub-objectives, (components of the first major objective), constituting the sufficient conditions for full operation of the Center. These will be accomplished over the remaining four years of the initial five year period.

Following are the three major objectives:

First Major Objective:

DEVELOPMENT OF A REPLICABLE PARADIGM OF EDUCATIONAL EXPERIENCES WHICH CAN MAXIMIZE LEARNING OPPORTUNITIES WITHIN A CHILD'S ENVIRONMENT AND LEAD TO FULL REALIZATION OF THE POTENTIAL OF CHILDREN FROM AGE TWO TO NINE:

Second Major Objective:

DEVELOPMENT AND VALIDATION OF A METHOD FOR DIAGNOSING THE EDUCATIONAL NEEDS OF CHILDREN FROM AGE TWO TO NINE, USING A COMPUTER STORAGE AND RETRIEVAL SYSTEM TO PROCESS SALIENT INFORMATION ON EACH CHILD.

Third Major Objective:

DEVELOPMENT OF A SET OF SYSTEMATIC PROCEDURES WHICH WILL PERMIT RELIABLE AND VALID MEASUREMENT OF THE RESULTS OF EDUCATIVE STRATEGIES EMPLOYED TO PERSONALIZE INSTRUCTION FOR CHILDREN, AS WELL AS VALIDATION OF CAREL'S PROJECT DURING THE RESEARCH, FIELD TESTING, DEMONSTRATION AND DIFFUSION STAGES.

To achieve the first major objective, CAREL's proposed paradigm for maximizing educational opportunities must systematically address itself to the milieu of the target population. The child is viewed as the center–literally the

[3] Ira Gordon, *Developmental Evaluation of Developmental Programs: A Brief Position Paper,* 1968.

target of action. He lives within a learning climate, the nature of which is partly dictated by six identifiable components:

1. the learning experiences he is given;
2. the technology applied to his needs;
3. utilization of staff;
4. development of staff;
5. the nature of personal and social growth services; and
6. the use of time and space.

This conceptualization of manipulable components affecting the child leads to the further concept that all six of them function within a wider learning environment, that of the home, school, and community. None of these components or environmental elements are mutually exclusive. They all overlap to some degree, but they provide focal points—variables—bearing heavily on the child at the center of concern. The optimum variations of the operating (or strategy-planning) components, as well as the attempt to modify the home-school-community learning environment in a positive direction rest upon achievement of the six sub-objectives discussed in the following section.

To achieve the second major objective, a research-validated statement regarding the factors that influence learning must be developed, and appropriate measuring devices and instrumentation for the collection of data as well as for the computer storage and retrieval of data must be identified.

At the same time, adequate safeguards must be developed to guarantee the protection of privacy of parents and pupils in CAREL's Center for Educational Diagnosis and Learning.

In achieving the third major objective, it should be understood that CAREL accepts, as basic, whatever statement of educational goals has been approved by the Board of Education of the community in which a Center for Educational Diagnosis and Learning is to be established. However, this acceptance is given with the reservation that children's learning must begin wherever they are and advance at a pace that is realistic for them regardless of previously stated grade-level objectives. Moreover, as diagnosis uncovers unusual potentials and special learning needs in children that are outside the usual curriculum guides, CAREL will expect its Center staff to be permitted to add additional behavioral objectives and try out innovative experiences to help the pupils fulfill their potentials, overcome their deficits, and achieve emotional health and social usefulness.

METHODS AND PROCEDURES

The methods and procedures for accomplishing the three major objectives of the CAREL project are best described in terms of the sub-objectives underlying their achievement.

SUB-OBJECTIVE 1 OF MAJOR OBJECTIVE I

Identification of the site (or sites) where the Center (or Centers) will be located.

Aside from the obvious necessity of obtaining one or more school sites in order to commence operations, the particular demographic characteristics of the communities in which such schools lie will modify the specific configuration of the paradigm developed, since the child's environment has major impact on educative processes and possibilities applicable to him. CAREL staff is in the process of discussing the proposed Early Childhood Centers for Educational Diagnosis and Learning with representatives of interested school systems in order to make joint planning possible. Several educational institutions and school systems have already indicated a strong desire to participate.

SUB-OBJECTIVE 2 OF MAJOR OBJECTIVE I

Establishment of groups with interlocking memberships representing all cooperatively interested populations including site-community members, local public agencies and officials, Center staff, consultants, CAREL staff, and staff of the State Department of Education.

One of the more valuable and immediate outcomes of establishing the CAREL Center for Educational Diagnosis and Learning in a given community will be a community organization pattern receptive to innovative educational processes. Once established, such an organization may serve as a model for other communities desiring orderly change. Since the Center requires the support of the entire community and of the public agencies of that community, it has been proposed, as noted in an earlier section of this paper, that a *Center Assembly* be formed of representatives of the community at large, all interested community bodies, and CAREL (method of selection of members to be determined during the planning stage). This Assembly, in addition to considering all aspects of community involvement in the Center, and making recommendations in that context, would elect one-third of the members of a *Center Advisory Council,* the duties of which would be to pass on questions involving the development and nature of the Center itself. The other two-thirds of the membership of the Advisory Council would be appointed by governmental and educational bodies and by CAREL. The Advisory Council would, in turn, together with governmental and educational bodies and CAREL, appoint members of a *Neighborhood Center School Board,* which would function in the manner of other school boards, but specifically and only in relation to the Center. Precise numbers of the members of these three Center bodies and the exact agencies from which they would come would vary with the size and nature of the community in which the Center may be established. One major feature of this schema has not been touched upon. A link must be forged between the CAREL Center for Educational Diagnosis and Learning, with its organized community, and the school system which has been administering the area up until establishment of the Center. This can take many forms, again depending on the

nature and size of the community concerned, ranging all the way from a "mutual powers" agreement between the Neighborhood Center School Board and the School System having prior jurisdiction, to a Center Non-profit Corporation responsible for all operations of the Center and its attendant community bodies. If a formal body such as this were set up, its members would also derive from governmental and educational bodies and from CAREL.

All of these bodies would be entitled to engaged consultants and set up workshops to assist them in carrying out their major functions. The specific nature of their decisions and policies would be responsive to local conditions and needs, but the form of organization sketched out can be considered a replicable mechanism, flexibly geared for educational change in different kinds of communities.

SUB-OBJECTIVE 3 OF MAJOR OBJECTIVE 1

Development of a plan for a coordinated training system, whereby faculty members of higher institutions of learning will assist in development of the staffs of both direct instructional and support services teams, as well as advise on staff utilization problems.

Three institutions in Washington, D.C., have agreed to work cooperatively with CAREL in training instructional and support teams consisting of both professional and para-professional personnel. These institutions are D.C. Teachers College, Federal City College, and Washington Technical Institute. It is proposed that training of CAREL Center teams will be carried out through a consortium arrangement of these three colleges. CAREL will furnish primary administrative responsibility and guidance for project implementation as well as on-going evaluation and ultimate dissemination.

In order to encourage participation by members of the communities in which Centers are located, training programs will not have academic admission requirements. Trainees will be able to become members of support teams at whatever level of performance they reach, while those who are able and interested can work on toward standard academic degrees.

SUB-OBJECTIVE 4 OF MAJOR OBJECTIVE I

Development of cybernetically modifiable learning experience sequences in all content areas for students of varying background, capabilities, and behavioral characteristics.

Organization of the Center staff and the children is designed to facilitate the achievement of this sub-objective.

A Center coordinator will manage staff utilization decisions in each Center. The staff will be prepared for at least four levels of operation: team coordinator level, specialist level, regular teacher level (probationary for first two years) and intern- or student-teacher level. There will be certified instructional secretaries, and aides will be trained for varying levels of operation. Special teachers will be part of the Center staff.

Direct Instructional Teams will operate at the classroom level. Each team will consist of a coordinator, three or more regular teachers, one or more aides, an instructional secretary and interns or student teachers. Each Direct Instructional Team will be charged with planning and conducting the total learning experiences of one hundred to one hundred and seventy-five students.

Support Services Teams will assist Direct Instructional Teams in developing resources and instructional units. They will function throughout the Center in ways such as creating instructional materials and serving as liaison between the Center, home and community.

An Instructional Systems Committee will be formed, consisting of the CAREL Program Director, the Center Coordinator and all team coordinators. It will be charged with making local instructional decisions to be carried out by the teams. Such decisions will be subject to review by the Neighborhood Center School Board.

(Development of organizing frameworks and the diagnostic questions to be asked are treated under the second major objective below.)

Strategies will be planned to train staff members to arrive at valid diagnoses of the factors influencing the learning behaviors of children. Staff members will also be trained to describe pupils' learning needs on the basis of these diagnoses.

The main strategy will involve the use of actual case data in individual work sessions and in group practice sessions in which actual diagnoses are made and evaluated.

The learning sequences developed will be subject to modification as feed-back regarding student progress is received. This is the cybernetic aspect of the process. Such feed-back will be reviewed on every child in the project at frequent intervals.

SUB-OBJECTIVE 5 OF MAJOR OBJECTIVE I

Establishment of a system for selection and acquisition of appropriate technological processes and devices, deemed essential or highly desirable by staffs and consultants.

Programmed learning devices will be examined and selected wherever diagnoses indicate that they will be effective. The heuristic data-bank treated under the second major objective below, will require a computer and possibly peripheral devices. Means will be found to evaluate such technological adjuncts to the learning process as well as audio-visual aids, and to select on the basis of such evaluations. Consideration

will be given to discovering multiple sources of funding so that required items can be obtained and used. Special materials not otherwise available will be created by technicians and graphic artists.

SUB-OBJECTIVE 6 OF MAJOR OBJECTIVE I

Development of a two-dimensional time-space matrix enabling flexible scheduling of all aspects of the Center's activities and permitting shifts of emphasis in accord with data derived from on-going feedback.

If time is considered to extend along the horizontal axis of a two-dimensional matrix, and the total Center environment along the vertical axis, it can be seen that the activities and progress of all actors in the CAREL project–students, parents, teachers, and others–can be plotted in relation to each other in the matrix space. This flexibility of depiction will aid in ensuring flexibility in actual operation, since conflicts and problems requiring modification will generally be foreseen on the matrix chart.

SUB-OBJECTIVE 1 OF MAJOR OBJECTIVE II

Development of a research-validated statement regarding the factors that influence learning.

An organizing framework, which integrates all known relevant factors that influence learning into a comprehensive list, was first developed as a part of the Child Study Program of the Commission on Teacher Education of the American Council on Education. It was based on a synthesis of scientific knowledge in the fields of biology, anthropology, sociology, psychology, psychiatry and medicine at the Collaboration Center of the Commission on Teacher Education, housed at the University of Chicago. It organized the relevant data about factors which influence learning into a six-factor framework.

As new research findings were published, the framework has been kept up to date by the staff of the Institute for Child Study at the University of Maryland as well as other centers which have embarked on the Child Study Program.

In 1964, after two years in the Far East, Australia and Africa involving contacts with scholars who provided additional perspectives, Dr. and Mrs. Daniel A. Prescott made a major revision in the organizing framework, setting it up on a seven-factor basis by separating the growth of intelligence and the emergence of higher cognitive process from the factors that organize the individual's concept of self and determine the cybernetic feed-back mechanisms which govern much of an individual's perception. This was done in 1964 and the work has been revised annually since then.

It is proposed that a jury of three to five scholars would:

1. begin with the seven-factor framework and accept, add or delete items;
2. identify relevant research data on early childhood which have particular implications for developing an organizing framework and learning experiences in the Center;
3. create an organizing framework of factors which influence learning by using Thurstone's attitude scale construction technique[3] under the direction of the CAREL staff.

The results of this process, which would lead to the identification of the organizing framework of factors which influence learning, would serve as the basis for the development of pre- and in-service training programs for instructional teams.

More than twenty years of experience by Dr. Prescott and his associates in training teachers to diagnose the educational needs of individual pupils has shown that, in addition to an organizing framework to help them classify and organize data, they need a series of questions, answers to which are invaluable in the process of diagnosis and an absolute requirement in order to create a common baseline of data. Such a series of questions has been revised annually for the last five years by Dr. and Mrs. Prescott for use in the Child Study Program in Omaha, Nebraska. The seven-factor framework and the current set of related questions are available at CAREL. It is suggested that the jury of three to five scholars or a separate similar group, start with this series of questions, check them for significance, and add or delete items and provide CAREL with a list of questions that need to be answered in diagnosing the factors influencing the learning of each individual, his learning status and his immediate needs for educative experiences. The procedural steps described earlier in relation to the identification of the factors which influence learning would be followed in establishment of the questions.

SUB-OBJECTIVE 2 OF MAJOR OBJECTIVE II

Identification of appropriate measuring devices and instrumentation for the collection of data and for computer storage and retrieval of data.

In order to achieve this objective the factors that contribute to learning and the questions which help teachers make effective diagnoses must first be identified. The techniques to be used in the measurement of behavior must be compatible with the nature and developmental stage of the population to be studied. Historically, case records and observational techniques have been employed as devices to collect information about young children.

It is proposed that the organizing framework developed by the jury can be used as the basis for classifying and organizing

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[3] J. P. Guilford, *Psychometric Methods*, second ed. (New York: McGraw-Hill, 1954), pp. 457-459.

data. The series of questions relating to the diagnosis of each pupil as developed by the jury can then be used by teachers in making diagnoses. There are one hundred and twenty case records now available at CAREL upon which the construct–organizing framework and questions–can be tried out. By using the organizing framework and question series to test the adequacy of data available in each case record as well as the validity of the answers found in such case records, factors influencing a given pupil's learning performance and the nature of his needs for educative experiences could be coded for computer storage. Records or portions of records found inadequate in scope of validity of data would not be included in the data bank.

The Central Atlantic Regional Educational Laboratory has begun to gather salient information relating to the identification of reliable and valid instruments. Nine such instruments were piloted during the spring of 1968. It is also felt that the highly successful approach developed by Dr. Samuel M. Goodman[4] in the validation of curricular innovations tried in Montgomery County, Maryland, warrants further use and development.

SUB-OBJECTIVE 3 OF MAJOR OBJECTIVE II

Development of adequate safeguards to guarantee the protection of privacy of parents and pupils in the CAREL Center for Educational Diagnosis and Learning.

Based on the experience of the Child Study Program three strategies appear to be necessary:

(1) Teachers, all supporting team members, administrative and supervisory officers must develop a strong code of professional ethics regarding the safeguarding of data about children and families.

(2) A formula for periodic review, including penalties for violations of the code is necessary.

(3) The administration of the school system involved, as well as the administration of CAREL, must guarantee that stored data about individuals will not be made available to unauthorized personnel who may seek it. Legislation should be sought in every state where CAREL operates a Center for Educational Diagnosis and Learning to make the stored content of data banks privileged information comparable to physicians' records.

(4) Safeguards against unauthorized use of the data bank must be built into the computer programs themselves.

SUB-OBJECTIVE 1 OF MAJOR OBJECTIVE III

Development of procedures to collect data on the factors which influence learning.

The basic assumption which dictates that the individual child must be used as the unit of analysis in order to personalize instruction requires the development of data-collection procedures which involve:

1. acquisition of initial common baseline data on each child;
2. updating of continuously changing demographic data;
3. recording of on-going observable behavior;
4. periodic review of the data-bank.

The successful completion of these four tasks will require the collection of a wide variety of information from parents, teachers, children, and administrators. In addition, planners need facts about what actually occurs in classrooms, about the relationships, if any, between a particular kind of school organization and teacher behavior. They need to know how children perceive the school setting and the work they do, as well as the relation between their perceptions and the situation as perceived by trained observers. The feelings of parents regarding homework, the locus of school control, and related matters are relevant. The instruments previously noted were designed to obtain this kind of information from students, teachers, parents, and other persons involved in the educational process.

Another feature of the project involves the presence of one or more Idea Teams during the planning and development stages of CAREL Centers for Educational Diagnosis and Learning, as well as after they are launched. Idea Teams will be invited from interested institutions to be participant-observers in all aspects of the Center–including testing and evaluation. They, along with CAREL staff and others involved, will engage in the development and use of instruments designed to chart the progress of the Center in terms of its objectives and sub-objectives.

It is projected that in carrying out these procedures the Idea Teams will be given an opportunity to experience the necessary on-the-job training which should lead to the ability to successfully replicate centers in their own areas.

SUB-OBJECTIVE 2 OF MAJOR OBJECTIVE III

Development of procedures for the assessment of the effects of the teacher diagnosis and strategy planning activities.

The cybernetic approach to the personalizing of instruction for children in the Center demands a continuous system of decision making by the instructional teams, utilizing the baseline data as well as data gathered periodically through diagnosing and re-diagnosing the children themselves by means of the CAREL Center recycling process. All juxtapositions of the six strategy-planning components, with the organizing factors affecting learning as they bear on outcomes in the cognitive, psychomotor, and affective behavioral domains, must be studied.

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[4] Samuel M. Goodman, *Prevailing Curriculum Practice and the Goals of Education,* (Office of Research, Montgomery County Public Schools, 1962, Bulletin No. 2, p. 2).

The periodicity of the recycling process will vary from child to child, but will in all cases be quite frequent. This is the heart of the feedback system which the CAREL Center will use to constantly modify its techniques in a positive direction, omitting unworkable features as they become apparent, and designing new ones as the recycling process shows they are needed. Details of the CAREL recycling process and its implications for child-diagnosis are available at CAREL.

SUB-OBJECTIVE 3 OF MAJOR OBJECTIVE III

Development of a research design which permits the systematic evaluation of the results of the project.

The general procedure to be followed regarding measurement and evaluation of the specific populations and components of the Center for Educational Diagnosis and Learning will consist of three types of data-gathering activities:

1. **Pre-test measures** of the specific academic skills and knowledge of students, of their attitudes relating to content and the model center, and of classroom environment;
2. **On-going systematic classroom observation** of classroom organization and management of the learning environment; and
3. **Post-test measures** of specific academic skills and knowledge of students of their attitudes relating to content and the model Center, and of classroom organization.

The general research design will be dictated by the action model to be studied in an entire school setting. Programs in individual schools, if there is more than one school in a Center, will also be studied to determine their relative effectiveness.

Evaluation and research will be designed to obtain indices of achievement within the model. The basic unit of analysis will always be the individual student, his situation, and his curriculum.

EXPECTED OUTCOMES

Upon successful accomplishment of the nine sub-objectives which constitute the necessary conditions for the initial year's operation (leaving the last three sub-objectives of the First Major Objectives for the remaining four years), the following outcomes can be expected by July 1, 1969, provided adequate support is forthcoming:

1. A **contractual agreement** (or other suitable arrangement) with at least one school system for a period of at least four years (July 1969 through July 1973) to provide one or more sites for operation of a Center for Educational Diagnosis and Learning.
2. A **set of agreements** developed with interested community representatives and agencies which provide for carefully defined and meaningful participation in formulating the policies governing the Center.
3. A **contractual agreement** with the consortium of three District of Columbia Colleges–District of Columbia Teachers College, Federal City College and Washington Technical Institute–for a period of at least four years (July 1969 through July 1973), which provides for the development of pre- and in-service courses consistent with the objectives of the Center.
4. A **valid method** for diagnosing the organizing factors that influence the learning of children, aged two to nine, as determined by scholars in the field of early childhood education, adaptable to future man-machine manipulation.
5. A **set of reliable and valid instruments** for the collection of data pertinent to the organizing factors that influence the learning of children, aged two to nine.
6. A **procedure** which will guarantee adequate safeguarding of the privacy of parents and pupils in relation to data stored in CAREL's data bank.
7. A **system** which provides necessary information about the organizing factors that influence learning, permits the development of strategies for personalizing instruction, and provides relevant feedback for corrective action on individual students.
8. A **research design** which will permit systematic evaluation of the underlying construct of the Center.

In the process of accomplishing the remaining sub-objectives of the project, two long-term outcomes can be anticipated. Upon successful completion of the sufficient conditions of the project design, by July 1, 1973, there should be:

1. A documented comparison between the theoretical list of organizing factors and a statistically derived list of those organizing factors that actually influence learning.
2. A statement containing clear and detailed data regarding the fiscal, logistic, and staffing requirements for replicating Centers for Educational Diagnosis and Learning in other communities, acquired through development of an operating Center in the field and including the development of a replicable paradigm of educational experiences.

Upon completion of the first year of operation, under conditions of adequate support, it is anticipated that one or more centers for educational diagnosis and learning will be functional in the sense that their real growth and development can begin. During the next four years, major modifications and adaptations will undoubtedly take place subject to on-going evaluation. At the end of this period, a replicable model of an institution, capable of reshaping the educational process for those whose needs are not presently being met, should be demonstrable.